Zero Retries issue 0117 2023-09-22

Zero Retries is an independent newsletter promoting technological innovation in Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Now in its third year of publication.

About Zero Retries

Steve Stroh N8GNJ, Editor

Jack Stroh, Late Night Assistant Editor Emeritus

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Web version of this issue - https://www.zeroretries.org/p/zero-retries-0117

Request To Send

Editorial by Steve Stroh N8GNJ

Apologies to email subscribers for this issue shipping a few minutes late.

I’ve reached a new level on Zero Retries when I want to quote myself… and *cannot find the reference* 😐 With 116+ issues now, even the search function didn’t help. I think what I’m looking for was a comment reply, that’s relevant to the amount of info covered in this issue, something like…

One of the agonies of the format of Zero Retries as a weekly newsletter is that it represents a brief snapshot in time about what I found Zero Retries Interesting *and could fit into one week’s issue of Zero Retries*. Each issue of Zero Retries just can’t really portray the bigger picture of the all the fascinating and interesting technological innovation that’s going on in Amateur Radio and adjacent to Amateur Radio.

That’s *especially* true this week.

Update 2023-09-29 - Found my quote!

On Mastodon 2023-08-31:

> @oh2cil@fedi.oh2cil.radio said
>
> @n8gnj Thank you for this, I very much enjoyed the MMDVM-TNC and WINTNC bits, seems there is still hope for amateur radio data networking, and maybe even reason to get an MMDVM one of these days.

I replied:

> Steve Stroh N8GNJ@n8gnj@mastodon.radio
>
> @oh2cil Markus - One of the agonies of a periodical like Zero Retries is that when looking at one issue like ZR 0113, you merely get a snapshot of what's happening that I had time / room / inclination to feature THAT week. Zero Retries exists because there is a LOT going on in Amateur Radio technological innovation (especially networking) that ISN'T getting reported elsewhere, especially in the "mainstream". Suggest digging deep into the back issues for a bit more on AR networking.

Catching up on Acknowledging Paid Subscribers

While I acknowledge Founding Members of Zero Retries[1] in every issue of Zero Retries

- Founding Member 0000 - Steven Davidson K3FZT
- Founding Member 0001 - Prefers to Remain Anonymous 01
- Founding Member 0002 - Chris Osburn KD7DVD
- Founding Member 0003 - Don Rotolo N2IRZ
- Founding Member 0004 - William Arcand W1WRA
- Founding Member 0005 - Ben Kuhn KU0HN
- Founding Member 0006 - Todd Willey KQ4FID

… I've neglected to acknowledge Paid Subscribers as they *became* Paid Subscribers (often from originally subscribing as free subscribers).

I apologize for not doing so from when I activated payment options on 2023-06-29; again, it's been a busy summer.

Now correcting that neglect, *Thank You, Paid Subscribers to Zero Retries:*

- Prefers to Remain Anonymous 02
- Florian Lengyel WM2D
- Prefers to Remain Anonymous 03
- John Simmons NK0K
- Orv Beach W6BI
- Paul Elliott WB6CXC
- Prefers to Remain Anonymous 04
- Prefers to Remain Anonymous 05
- Prefers to Remain Anonymous 06
- Prefers to Remain Anonymous 07
- Prefers to Remain Anonymous 08
- Prefers to Remain Anonymous 09
- Prefers to Remain Anonymous 10
- Don Coker KM6TRZ

- Sid Siegel
- Prefers to Remain Anonymous 11

I'm particularly grateful to

- Steven Davidson K3FZT
- Prefers to Remain Anonymous 01
- Prefers to Remain Anonymous 02
- Florian Lengyel WM2D

who pledged their financial support to Zero Retries *even before I activated Payment Options on 2023-06-29*.

In the future, I will mention Paid Subscribers *as they become* Paid Subscribers, and will mention all of the Paid Subscribers periodically.

I am very, very grateful for *all* financial support for Zero Retries.

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Revisiting the KM6LYW Radio DigiPi Project

By Steve Stroh N8GNJ

Now that Raspberry Pi units are becoming more widely available (see rpilocator for worldwide availability), and DigiPi v1.7 was recently released, it seemed an appropriate time to revisit the DigiPi Project.

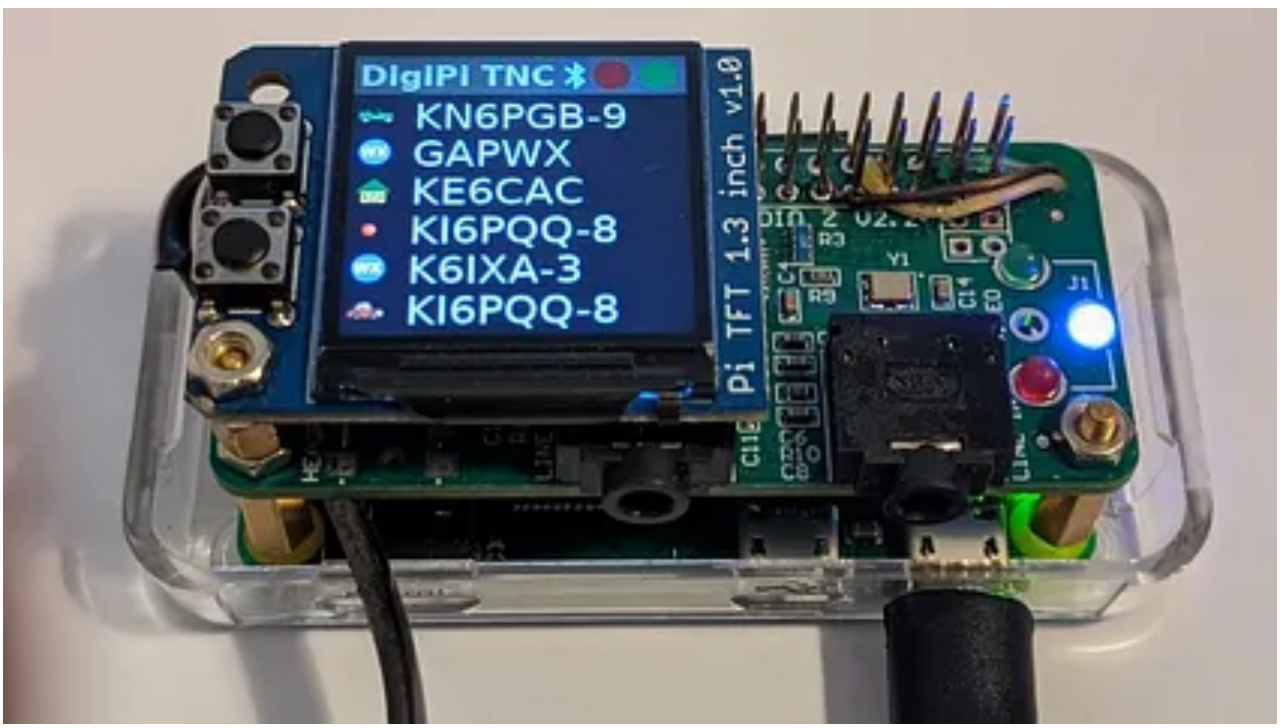

Image courtesy of the KM6LYW Radio DigiPi Project

The DigiPi is the ultimate hot-spot for all amateur radio data modes, including APRS, ax.25, winlink email, ft8, js8cal, slowscanTV, PSK31, packet and even CW. The implementation is an elegant, inexpensive, low-power, open-source Raspberry-Pi--based amateur radio data transceiver, managed exclusively by web browsers or smart-phone apps, with no bulky keyboards, monitors or complicated wiring.

As seen in the illustration above, the DigiPi is designed around the form factor of a Raspberry Pi Zero / Zero W / Zero2 W, but it's *not required* to use those compact units. DigiPi will work with nearly any Raspberry Pi (for performance, the more modern Raspberry Pi's work a bit better, but a Raspberry Pi 4 is probably overkill (unless you already have one that's not being used).

DigiPi is a project of Craig Lamparter KM6LYW, who hosts the KM6LYW Radio YouTube channel, which is sufficiently, *consistently* Zero Retries Interesting to merit inclusion in the **Closing the Channel** section in every issue of Zero Retries.

DigiPi seems to be an ideal, reasonably inexpensive starter project for data communications via Amateur Radio. It's versatile, as demonstrated in the v1.7 video above, showing it being used with an inexpensive Baofeng portable radio, *and* a high-end Icom IC-705. DigiPi can be interfaced with nearly any radio that has audio in, audio out, and a push-to-talk input. The project page provides ample documentation for building a DigiPi, and there are also a number of videos available to show actual construction details and techniques.

What's most interesting to me, and the primary differentiation of DigiPi versus other Raspberry Pi-based Amateur Radio "modems", is that DigiPi is designed to be an unobtrusive unit sitting in a corner, with no display (other than the optional small display *on* it). You interact with the DigiPi remotely via a larger computer or tablet or phone via a network connection. Note that *the DigiPi is doing the "heavy lifting"* - modem, application, etc. - the computer or tablet is merely display input / output.

In my view, there are a few *minor* concerns with DigiPi:

- Some soldering[2] is required; DigiPi is not a project that can be entirely assembled from "plug and play" hardware modules / cables. Thus to build a DigiPi you'll need access to some (simple) soldering equipment and a bit of experience in soldering. Thus DigiPi is an ideal project to work on with a more experienced mentor.

- Support for DigiPi is only available via a Discord group or Google Groups[3] mailing list. In my specific experience, I find Discord forums to be "high bandwidth", but folks with more agile brains probably won't have the same issue.

- While you can download the software for DigiPi freely…
  Password is currently available to patrons on the KM6LYW Patreon Page.
  See the DigiPi project page for an explanation of this policy.

It's worth noting that one of the primary components of the DigiPi, the audio board (for [the majority of] radios that don't have a built-in audio interface):

> Fe-Pi Audio Z v2 [x] *1 Fe-Pi Sound Card without kit* WB7FHC ($24)

is sourced from my friend and Bellingham Amateur Radio colleague Budd Churchward WB7FHC. The Fe-Pi was discontinued by its original creator and WB7FHC was able to "bring it back from the dead". If you do purchase a Fe-Pi from WB7FHC, I suggest dropping him a note of Thanks for his willingness to continue supplying Fe-Pi units (especially at such a reasonable price).

Now that things have settled down a bit in our respective lives, I look forward to building a pair of DigiPi units with my daughter

Merideth sometime this winter (with some of that soldering mentoring that I spoke of above).

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My Letter to ARRL Regarding Elimination of Symbol Rate from US Amateur Radio Regulations

By Steve Stroh N8GNJ

This is a longstanding issue; for context, see:

- *The Annual Pactor 4 Hurricane Ritual (Zero Retries 0066)*
- *US Legislation Proposed to Force FCC to Replace Symbol Limit on HF with 2.8 kHz Bandwidth Limit (Zero Retries 0078)*
- *Interesting Letter to FCC from Texas Department of Public Safety (Zero Retries 0109)*
- *Instructive Exchange Between Representative and FCC Chair (Zero Retries 0114)*

Update post-publication - This article was edited after publication to remove a reference to New Packet Radio because in discussing NPR I misstated a major technical detail. See Zero Retries 0118 for details.

I concluded the latest article in this series (Instructive Exchange…) with this:

> **ARRL Appears to be the Conduit for Fixing the Symbol Rate Issue**
>
> As critical of, and unimpressed as I am with ARRL's efforts to date on embracing the disruptive nature of new technologies in Amateur Radio of the 21st Century, I reluctantly conclude from the above that the best chance to capitalize on *this brief window of interest / recognition* of the importance of the Symbol Rate issue… is to work through the ARRL.
>
> ***Thus, if you're an ARRL member, I suggest that you contact your ARRL officials (all of them) to explain to them that for Amateur Radio of the 21st Century… what's really needed is for all of the Symbol Rate limitations to be removed. Not just for HF bands, but also for the VHF / UHF bands. I think we ARRL members collectively need to specifically reach out to ARRL CEO David Minster NA2AA - na2aaa@arrl.org to impress on him the importance of including VHF / UHF in their work on removing Symbol Rate limitations***.

Thus, here is my intended letter to NA2AA, the Officers, and Division Directors and Vice Directors of ARRL. I will be sending this letter[4] to all of them via email in the coming weeks.

Dear ARRL Officer:

As background, I am a member of ARRL and an Amateur Radio Operator who is active in experimentation and operation of data communications on US Amateur Radio VHF and UHF bands. I publish a small newsletter called Zero Retries that focuses on technological innovation in Amateur Radio, including advanced methods of data communications.

I am writing to you about the "Symbol Rate Issue" that is unnecessarily restricting US Amateur Radio Operators from making use of advanced data communications techniques. The "Symbol Rate Issue" is *much larger* than the ARRL's specific concerns about use of Pactor 4 modems in US Amateur Radio spectrum; more on this later in this letter.

Notably, in this recent YouTube video:
https://www.youtube.com/watch?v=i4IbeUAeejA,
FCC Commissioner Simington makes specific reference to *… a number of friends in the Amateur Radio Relay League….* Thus, *in this rare moment*, ARRL *seems to have the attention* of three influential regulators…

- Representative Debbie Lesko of Arizona
- FCC Commissioner Nathan Simington
- FCC Chairperson Jessica Rosenworcel

… that the "Symbol Rate Issue" is unnecessarily restricting the use of advanced data communications techniques in Amateur Radio.

As I related in Zero Retries:

> In an email conversation, a knowledgeable friend explained to me that Rocenworcel's statement that "the record is stale" is FCC-speak for:
>
> *We did get comments on this issue, but took no action then. Enough time has passed that to proceed on this issue, we probably need to start over.*

Thus it seems likely that there will be a "do over" within the FCC on the issue of symbol rate limitations in US Amateur Radio.

Thus, the combination of the attention from the three regulators, and the likely "do over" provides an opportunity to fix the **Bigger Picture** of the "Symbol Rate Issue" - not just for US Amateur Radio HF bands, *but also for US Amateur Radio VHF and UHF bands*.

On the US Amateur Radio VHF and UHF bands, advanced methods of data communications are being unnecessarily restricted even more severely than on the HF bands.

Reference: ARRL's online FCC Part 97 text - http://www.arrl.org/part-97-text

> §97.307 (f) (5) A RTTY, data or multiplexed emission using a specified digital code listed in §97.309(a) of this part may be transmitted. The symbol rate must not exceed 19.6 kilobauds. A RTTY, data or multiplexed emission using an unspecified digital code under the limitations listed in §97.309(b) of this part also may be transmitted. The authorized bandwidth is 20 kHz.

In my opinion, the limitation of 20 kHz bandwidth is reasonable for the specified bands - 6m and 2m.

> §97.307 (f) (6) A RTTY, data or multiplexed emission using a specified digital code listed in §97.309(a) of this part may be transmitted. The symbol rate must not exceed 56 kilobauds. A RTTY, data or multiplexed emission using an unspecified digital code under the limitations listed in §97.309(b) of this part also may be transmitted. The authorized bandwidth is 100 kHz.

In my opinion, the limitation of 100 kHz bandwidth is also reasonable for the specified bands - 1.25m and 70cm.

Note that there are no symbol rate limitations for bands above 70cm.

Limitations on "symbol rate" *were* understandable for data communications in the era of simpler analog radios and modems where use of high data rates could cause a radio to exceed acceptable technical parameters such as the authorized bandwidths of 20 kHz and 100 kHz.

But in the *current* era of software defined radios, where not just a data modulation, but the *entire transmitted waveform* can be generated with incredible accuracy, including technical parameters such as bandwidths, symbol rate limitations are an antiquated concept, and thus should be eliminated from the US Amateur Radio rules.

*Thus I urge that ARRL, in this rare moment of attention with the FCC and Congress, when attempting to "Fix the Symbol Rate Issue", **also seek removal of symbol rate limitations from the US Amateur Radio VHF and UHF bands** as well as the US Amateur Radio HF bands.*

Respectfully,

Steve Stroh N8GNJ

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Latest AREDN Updates

By Orv Beach W6BI

This article was originally posted by W6BI on a number of AREDN-related mailing lists. - Editor

Since the last AREDN software production release, there have been a number of nightly builds, some of which contain significant enhancements. As usual, the AREDN devs would appreciate some helping testing the updates. Here's a list of the most significant ones.

- If you're planning on buying a new Mikrotik device, you'll need to install a recent nightly build on it [as] Mikrotik has changed their code's compression algorithm, and the AREDN code has been modified to accommodate it and allow successful software installations.

- The Search function has been streamlined.
- An installable cron package has been added for people who need more functionality than the built-in cron support.
- If you've downloaded and added extra packages to a node, after updating to the latest nightly build, later builds will remember those packages and download and reinstall the correct versions for you.
- Support for wildcard DNS entries has been added. This was done to support installing Sandstorm on a local computer. Sandstorm is an "app support platform" that lets you install and offer out over 70 web-based apps to your local AREDN community. It could be an excellent local support tool. [Note that any potential user of the Sandstorm platform will need to have a currently nightly build on their localnode.]
- Added support for the supernode network. If you're not familiar with it, a supernode is a modified AREDN node that links to other supernodes. It allows "super-tunneling" but doesn't pollute your local node list with hundreds of remote nodes. Here's a graphic showing the topography of a supernetwork.

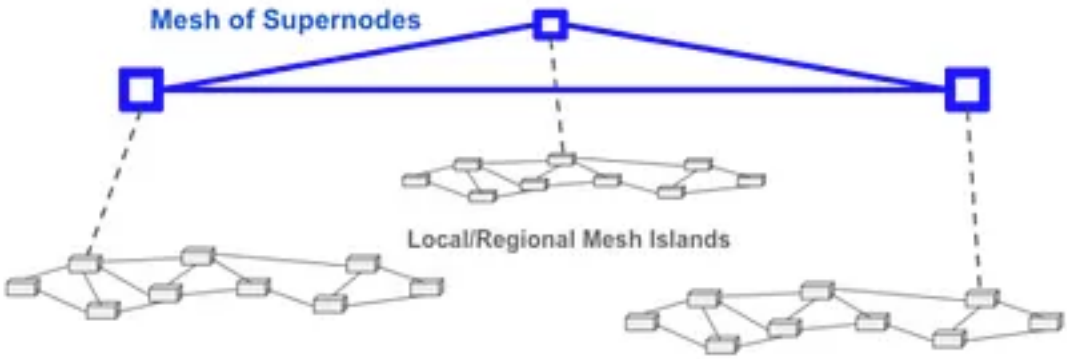

Image courtesy of Orv Beach W6BI (?)

AREDN documentation on this feature is here and here.

- After installing the latest nightly build if you see a "Supermesh" button on your node's screen, it means it's detected a local supernode. Clicking on that button will take you to your supernode's mesh status screen so you can view all the services available on the network. This behavior is defaulted on, but can be disabled in Advanced Configuration. Your local network will appear unchanged on your localnode.
- The AREDN supernode map is here. By clicking on the various node icons in the upper right you can hide and show various node types. Also note the new color - green. That's for supernodes, and the supernode links are blue.
- Possibly the most impactful change to you locally is that the default weight of a tunnel (what it contributes to an ETX value) has been changed from 0 to 1.
    - If there are both an RF link and a tunnel to a destination this nightly build may or may not change the preference to the RF path, depending on the quality of the RF link. For such a link configuration you could optionally crank up the tunnel weight high enough to where the node always (or usually) prefers the RF link. This would allow the tunnel to stay linked but not handle traffic unless the RF link went down. This would be an ideal configuration for a backup link. It's configurable in Advanced Configuration.
    - If your only link is a tunnel, this setting will have no impact on the behavior of your node.

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ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

CQ is Back!

Context - Two (Apparent) Passings (?) in Zero Retries 0115.

CQ's September, 2023 electronic edition has been posted. It's notable that this issue is Volume 79, Number 9 - *CQ has been in continuous publication for 79 years!* Few publications can claim that kind of longevity and I hope CQ beats the odds for technical magazines in this era and continues publication.

Multicarrier base station transceiver for DMR, YSF, M17 etc. with MMDVM and LimeSDR hardware

This article is from QRadioLink:

> *QRadioLink is a GNU/Linux multimode (analog and digital) SDR (software defined radio) transceiver application using the Internet for radio to VOIP bridging (radio over IP), built on top of GNU radio, which allows experimenting with software defined radio hardware using different digital and analog radio signals and a Qt5 user interface.*

Yay! This project is (finally) an illustration of the *real potential* of Software Defined Radio (SDR) technology - implement the entire stack of a data communications system via radio!

The author of this article uses a LimeSDR radio to implement not just an emulation of a conventional radio with input from a modem, but *also implements the modem!* He's already implemented transmit and receive of Digital Mobile Radio (DMR), System Fusion, and M17; all of them operate as seamlessly as selecting different memory channels on a conventional FM VHF / UHF radio.

This is where we're headed folks! Someone could package up *this system* - LimeSDR unit, power amplifier, and a simplified control panel, and sell it as a multimode digital voice radio. We've been seeking such a unit for more than a decade now.

My thanks to RTL-SDR.com for the pointer to this project.

Will *someone*… ***anyone***… please create a reasonable quality plug and play buffer amplifier + power amplifier for a Software Defined Transceiver (SDT) such as the LimeSDR units that will accept the very low power output of SDTs, to output *clean* (filtered) 25 watt (good enough) or 50 watt (preferred) transmit power? We really need this last piece for **practical** Software Defined Transceivers!

VarAC V8.2 - "Ice breaker", path finder random timer, Vmail relay info, "Sneak peek", VarAC cluster, Logger32 support & more

While "Icebreaker" is the signature feature of this update (among many other new features), the most significant feature of this update (in my opinion) is Path finder Random Timer:

> In V8.2, when you initiate a "path find" request, each station will now introduce a random delay of up to 60 seconds before responding. If they detect that the frequency is already occupied, they will persist in waiting until it becomes clear before replying to your path find request.

My thanks to Pseudostaffer Jeff Davis KE9V for the pointer to this item.

Full Duplex Added to Test Version of WSJT-X

From the AMSAT-DL forum:

> DG2YCB has released a test version of WSJT-X improved which supports full-duplex i.e. decoding of downlink signals during TX phase. This way you can control and correct your own uplink signal. Transmitted and re-received own transmissions are shown in the same color (default yellow) as on the TX page right. Its still a test version and may be buggy but Uwe and team are looking foward to feedback.
> The code can be downloaded here:
>
> https://sourceforge.net/projec…iles/WSJT-X_v2.7.0/Tests/
>
> The full-duplex functionality is enabled in "Decode" menu. See screenshot attached.
>
> vy73 de Florian DF2ET

Not mentioned in the snippet above, but this new capability is ideal for use on satellites QO-100 and AO-109, and (reportedly) includes many other useful satellite features (v2.7.1).

My thanks to Pseudostaffer Jeff Davis KE9V for the pointer to this item.

AMPKT - Amateur radio packet explorer

> This is a project to facilitate experimentation with connecting two Linux machine's network stacks via the amateur radio bands.

Apologies - I really need to find the original mention of this project because it was humorous (to me) that the original mention references the use of "Amateur Radio Bands" via a pair of Software Defined Transceivers with no more concern than bringing up an old Serial Line Internet Protocol (SLIP) link between two systems. Almost all of the configuration of the link was configuring the internal Linux networking. We really need to work to engage very bright, capable techies like this author into being more engaged in Amateur Radio!

Leave a comment

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Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out
Join the Fun on Amateur Radio for some pointers.

Zero Retries Frequently Asked Questions (FAQs) — In development 2023-02.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with radio technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to everyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing ***Thanks*** to:

- Tina Stroh KD7WSF for, well, *everything!*
- ***Founding Members* who generously support Zero Retries financially:**
  Founding Member 0000 - Steven Davidson K3FZT
  Founding Member 0001 - Prefers to Remain Anonymous 01

  Founding Member 0002 - Chris Osburn KD7DVD
  Founding Member 0003 - Don Rotolo N2IRZ
  Founding Member 0004 - William Arcand W1WRA
  Founding Member 0005 - Ben Kuhn KU0HN
  Founding Member 0006 - Todd Willey KQ4FID
- Numerous Annual and Monthly subscribers who also generously support Zero Retries financially!

Want to Support Zero Retries?

- The *most* effective way to support Zero Retries is to simply mention Zero Retries to your co-conspirators that are also interested in knowing more about technological innovation that is occurring in Amateur Radio and encourage them to become a fellow subscriber.
- One particularly effective method of promoting Zero Retries is to add a mention of Zero Retries to your QRZ page (or other web presence) and include a link:

  https://www.zeroretries.org
- If you'd like to financially support Zero Retries, becoming a paid subscriber is *greatly* appreciated and helps offset expenses incurred in publishing Zero Retries. Paid subscriptions for Zero Retries are *entirely optional*, as explained in this special issue of ZR:

Zero Retries Administrivia - Activating Payment Options.

These blogs and newsletters regularly feature Zero Retries Interesting content:

- Dan Romanchik KB6NU mentions "Zero Retries Interesting" topics so regularly on his blog (that I otherwise wouldn't know about) that I've bestowed on him the honorific of Pseudostaffer.
- Jeff Davis KE9V also mentions "Zero Retries Interesting" topics so regularly on his blog (that I otherwise wouldn't know about) that I've bestowed on him the honorific of Pseudostaffer.
- Amateur Radio Weekly by Cale Mooth K4HCK is a weekly anthology of links to interesting Amateur Radio stories.
- Experimental Radio News by Bennet Z. Kobb AK4AV discusses (in detail) Experimental (Part 5) licenses issued by the US FCC. It's a *must-read-now* for me!
- RTL-SDR Blog - *Excellent* coverage of Software Defined Radio units.
- TAPR Packet Status Register has been published continuously since 1982.
- Other Substack Amateur Radio newsletters recommended by Zero Retries.

These YouTube channels regularly feature Zero Retries Interesting content:

- HB9BLA Wireless by Andreas Spiess HB9BLA
- KM6LYW Radio by Craig Lamparter KM6LYW (home of the DigiPi project)
- Modern Ham by Billy Penley KN4MKB
- Tech Minds by Matthew Miller M0DQW

The Substack email publishing platform makes Zero Retries possible. I recommend it for publishing newsletters.

If you're reading this issue on the web and you'd like to see Zero Retries in your email Inbox every Friday afternoon, just click below to join ~~100~~ ~~200~~ ~~300~~ ~~400~~ *500* ~~600~~ ~~700~~ ~~800~~ *900+* other readers:

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If you're a fellow smart person that uses **RSS**, there *is* an **RSS feed for Zero Retries**.

Zero Retries (N8GNJ) is on Mastodon — n8gnj@mastodon.radio — just click:

Zero Retries / N8GNJ on Mastodon

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More bits from Steve Stroh N8GNJ:

- SuperPacket blog — *Discussing new generations of Amateur Radio Data Communications — beyond Packet Radio (a precursor to Zero Retries)*
- N8GNJ blog — *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs — Bellingham, Washington, USA*

Thanks for reading!
Steve Stroh N8GNJ / WRPS598 (He / Him / His)
These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham (The City of Subdued Excitement), Washington, USA.

2023-09-22

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Blanket permission granted for TAPR to use any Steve Stroh content for the TAPR Packet Status Register (PSR) newsletter (I *owe* them from *way* back).

1

Now corrected and updated.

2

I haven't examined the construction of a DigiPi closely, but it *may* be possible to make use of the lost art of wire wrap construction (instead of soldering to header pins) to do some of the interconnections. I'm of the vintage that I have experience (and still some tools) in building prototypes, *and too much experience in troubleshooting of protypes* using wire wrap.

3

In my observations, Google Groups is yet another "zombie" service from Google that isn't being actively maintained, and thus seems likely that Google will eventually "sunset" it as it has with so many other Google products / services that went into unmaintained zombie status.

4

I'm using formatting available within Substack here. Formatting in the letter I send will be adjusted for transmission via email.